

CLAIMS

What is claimed is:

1. A method to refine a lubricant comprising a compound having a perfluoropolyether structure, the method comprising:  
utilizing supercritical extraction by contacting the lubricant with an extracting medium of supercritical carbon dioxide under a predetermined condition in a pressure vessel to remove ionic impurities from the lubricant.
2. The method to refine a lubricant according to claim 1, wherein the predetermined condition is a combination of a temperature and a pressure at which a density of the supercritical carbon dioxide is less than or equal to a density of the supercritical carbon dioxide at a temperature of 60°C and a pressure of 20 MPa.
3. The method to refine a lubricant according to claim 1, wherein the ionic impurities are included in the group consisting of sodium ions, potassium ions, chloride ions, HCO<sub>3</sub> ions, HSO<sub>4</sub> ions, and sulfate ions.
4. A method to refine a lubricant comprising a compound having a perfluoropolyether structure, the method comprising:  
using supercritical extraction by contacting the lubricant with an extracting medium of supercritical carbon dioxide under a predetermined condition in a pressure vessel to remove a perfluoropolyether compound having a terminal group of weak polarity from the lubricant.
5. The method to refine a lubricant according to claim 4, wherein the predetermined condition is a combination of a temperature and a pressure at which a density of the supercritical carbon dioxide is less than or equal to a density of the supercritical carbon dioxide at a temperature of 60°C and a pressure of 16 MPa.
6. The method to refine a lubricant according to claim 4, wherein the perfluoropolyether compound having a terminal group of weak polarity is a perfluoropolyether compound having a terminal group included in the group consisting of CF<sub>3</sub><sup>-</sup>, CF<sub>2</sub>H<sup>-</sup>, and CF<sub>2</sub>Cl<sup>-</sup>.

7. A method to refine a lubricant comprising a compound having a perfluoropolyether structure, the method comprising:

utilizing supercritical extraction by

contacting the lubricant with an extracting medium of supercritical carbon dioxide under a first condition in a pressure vessel to remove a perfluoropolyether compound having a terminal group of weak polarity from the lubricant, and

contacting the lubricant from which a perfluoropolyether compound having a terminal group of weak polarity is removed with an extracting medium of supercritical carbon dioxide under a second condition to remove ionic impurities from the lubricant and to extract and recover the perfluoropolyether lubricant.

8. The method to refine a lubricant according to claim 7, wherein

the first condition is a combination of a temperature and a pressure at which a density of the supercritical carbon dioxide is less than or equal to a first density of the supercritical carbon dioxide at a temperature of 60°C and a pressure of 16 MPa; and

the second condition is a combination of a temperature and a pressure at which a density of the supercritical carbon dioxide is less than or equal to a second density at a temperature of 60°C and a pressure of 20 MPa.

9. The method to refine a lubricant according to claim 7, wherein the perfluoropolyether compound having a terminal group of weak polarity has a terminal group included in the group consisting of  $\text{CF}_3^-$ ,  $\text{CF}_2\text{H}^-$ , and  $\text{CF}_2\text{Cl}^-$ , and the ionic impurities are included in the group consisting of sodium ions, potassium ions, chloride ions,  $\text{HCO}_3^-$  ions,  $\text{HSO}_4^-$  ions, and sulfate ions.

10. A perfluoropolyether lubricant refined by utilizing supercritical extraction, wherein the lubricant contacts an extracting medium of supercritical carbon dioxide under a predetermined condition in a pressure vessel to remove ionic impurities from the lubricant.

11. A perfluoropolyether lubricant refined by using supercritical extraction, wherein the lubricant contacts an extracting medium of supercritical carbon dioxide under a predetermined condition in a pressure vessel to remove a perfluoropolyether compound having a terminal group of weak polarity from the lubricant.

12. A perfluoropolyether lubricant refined by utilizing supercritical extraction by contacting the lubricant with an extracting medium of supercritical carbon dioxide under a first condition in a pressure vessel to remove a perfluoropolyether compound having a terminal group of weak polarity from the lubricant, and  
contacting the lubricant from which a perfluoropolyether compound having a terminal group of weak polarity is removed with an extracting medium of supercritical carbon dioxide under a second condition to remove ionic impurities from the lubricant and to extract and recover the perfluoropolyether lubricant.
13. A magnetic recording medium comprising:  
a nonmagnetic substrate,  
a plurality of layers sequentially laminated on the substrate, the layers including at least  
a nonmagnetic underlayer;  
a magnetic layer, and  
a protective layer; and  
a lubricant layer, applied to the protective layer, wherein the lubricant layer substantially comprises a perfluoropolyether lubricant refined by utilizing supercritical extraction by contacting the lubricant with an extracting medium of supercritical carbon dioxide under a predetermined condition in a pressure vessel to remove ionic impurities from the lubricant.
14. A magnetic recording medium comprising:  
a nonmagnetic substrate;  
a plurality of layers sequentially laminated on the substrate, the layers including at least  
a nonmagnetic underlayer,  
a magnetic layer, and  
a protective layer; and  
a lubricant layer, applied to the protective layer, wherein the lubricant layer substantially comprises a perfluoropolyether lubricant refined by utilizing supercritical extraction by contacting the lubricant with an extracting medium of supercritical carbon dioxide under a first condition in a pressure vessel to remove a perfluoropolyether compound having a terminal group of weak polarity from the lubricant, and contacting a lubricant from which a perfluoropolyether compound having a terminal group of weak polarity is removed with an extracting medium of supercritical

carbon dioxide under a second condition to remove ionic impurities from the lubricant and to extract and recover the perfluoropolyether lubricant.

15. A magnetic recording medium comprising:
  - a nonmagnetic substrate;
  - a plurality of layers sequentially laminated on the substrate, the layers including at least
    - a nonmagnetic underlayer,
    - a magnetic layer; and
    - a protective layer; and
  - a lubricant layer, applied to the protective layer, wherein the lubricant layer substantially comprises a perfluoropolyether lubricant refined by using supercritical extraction by contacting the lubricant with an extracting medium of supercritical carbon dioxide under a predetermined condition in a pressure vessel to remove a perfluoropolyether compound having a terminal group of weak polarity from the lubricant.